

REMARKS

Claims 12-31 are pending in the application. Claims 28 and 31 have been amended. No new matter has been introduced. The specification has been amended to indicate that Application Serial No. 09/808,157, filed on March 15, 2001, has issued as U.S. Patent No. 6,692,703 on February 17, 2004.

Claims 28-31 are rejected under 35 USC § 103(a) as being unpatentable over Forsythe et al. (U.S. Patent No. 4,214,993) ("Forsythe") in view of Sauer et al. (EP 0969090) ("Sauer"). This rejection is respectfully traversed.

The claimed invention relates to a particular process of sucking/discharging of a nucleic acid containing solution into/out of a tip using a pumping means that is designed to cause pressure change for the sucking/discharging action (see, e.g., ¶[0034] of the specification, in which sucking/discharging is provided typically by a syringe pump). As noted in the specification, "in a sucking/discharging method, washing solution tends to remain within the solid phase used in a purifying or analyzing device and such remaining washing solution badly influences on the performance of a nucleic acid analysis." Thus, the invention is directed to removing the washing solution remaining in the solid phase by applying an air blow.

This remaining washing solution problem originates in the use of a solid phase with a low flow-through resistance in the sucking method, to allow the nucleic acid containing sample to easily flow through the solid phase. For example, an embodiment of the present invention uses a device that comprises blocking members 40a and 40b, the members being porous enough to permit liquid or gas to easily flow therethrough and powdered flint glass is filled between them.

Forsythe relates to a method of separating, by centrifugal force, components such as blood or urine together with spherical porous supports. Sauer relates to a method of recovering, by a spin column, nucleic acid using silica-gel membrane.

The subject matter of claims 28-31 would not have been obvious over Forsythe in view of Sauer. Specifically, the Office Action fails to establish a *prima facie* case of obviousness. Forsythe and Sauer, whether considered alone or in combination, fail to disclose, teach or suggest all limitations of amended independent claim 28. As noted, the crux of the present invention is the use of the air-blowing technique to remove the remaining washing solution in the sucking/discharging method. In contrast, both Forsythe and Sauer use the centrifugal separation method, and not an air-blowing technique, as in the claimed invention. Further, none of the cited references provides any description of, or suggestion for, the remaining washing solution problem, because both references fail to address sucking/discharging methods. Thus, none of the features of the air-blowing method as defined in the present invention can be derived from any of the centrifugal separation methods of Forsythe and Sauer.

Applicants note that the air-blowing practice of the present invention is based on the finding that the sucking/discharging method has a problem in that the pressure applied for transferring sample liquid tends to result in a left-off remainder in such liquid transferring. In contrast, both Forsythe and Sauer use the centrifugal separation method, according to which the solid phase to be used should have a high flow-through resistance so as to minimize the leakage of the sample liquid while setting the column on the centrifuge. Further, the sample liquid on the solid phase directly receives the centrifugal force. Therefore, little amount of the sample liquid will remain on the solid phase in the centrifugal separation method.

Applicants also note that Forsythe does not address nucleic acid recovery and, thus, the remaining washing solution problem cannot arise in the context of Forsythe.

Thus, it is clear that none of Forsythe and Sauer discloses, teaches or suggests that, "in a sucking/discharging method, washing solution tends to remain within the solid phase used in a purifying or analyzing device and such remaining washing solution badly influences on the performance of a nucleic acid analysis." Therefore, the assertion in the Office Action that the present invention is an easy derivative of Forsythe and Sauer is unsupported.

Applicants provide below additional reasons on why claims 28-31 are patentable over the combination of Forsythe and Sauer.

In Forsythe, the sample liquid is moved by the centrifugal force. Therefore, the automating of processing in Forsythe is difficult when such process requires features such as the ones provided in a nucleic acid extraction process of the claimed invention. Thus, automating of processing in Forsythe is difficult where, as described in one embodiment of the present invention, the extraction process includes the injecting of a reagent and requires an apparatus for temperature controlling other than the centrifuge.

In contrast, in the present invention, the sample liquid is discharged by a liquid transferring means (such as a pump), and then air is blown in to reduce the sample liquid remaining therein. Therefore, this mechanism is incorporated into an apparatus having a liquid feeding means and is suitable for automating of the nucleic acid extraction process that uses sucking/discharging like the one described in the present invention. These features of the claimed invention are not found in Forsythe.

Further, in the claimed invention, a repeated air-blowing is also available, which renders a higher quality and performance to the washing or cleaning process.

Sauer teaches that the reduction of the remaining amount of the washing solution is achieved by the air seasoning under room temperature. In contrast, in the present invention, the remaining washing solution is removed by air blowing. This air-blowing practice is less affected by variation of environments, such as room temperature changes, than the method of Sauer. The present invention further offers a time-reduced and efficient discharge of the remaining washing solution connecting to a time-saved high quality purification system. This feature is not present in Sauer.

In view of the above remarks, allowance of claims 28-31 is respectfully requested.

Dated: January 26, 2005

Respectfully submitted

By 

Mark J. Thronson

Registration No.: 33,082

Gabriela I. Coman

Registration No.: 50,515

DICKSTEIN SHAPIRO MORIN &
OSHINSKY LLP

2101 L Street NW

Washington, DC 20037-1526

(202) 785-9700

Attorneys for Applicants